

Role of biomass in meeting future energy demands

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IEA Bioenergy Task 40

**Workshop Biomass supply challenges
– how to meet biomass demand by 2020
15 March 2012, Rotterdam, The Netherlands**

core objective IEA Task 40: *“to support the development of a sustainable, international, bioenergy market, recognising the diversity in resources, biomass applications”*

Key working fields

- Securing sustainable biomass supplies
- Sustainability & certification
- Trade, market and demand dynamics
- Transport, logistics and trade
- Outreach and dissemination

Current Member Countries IEA

Task 40

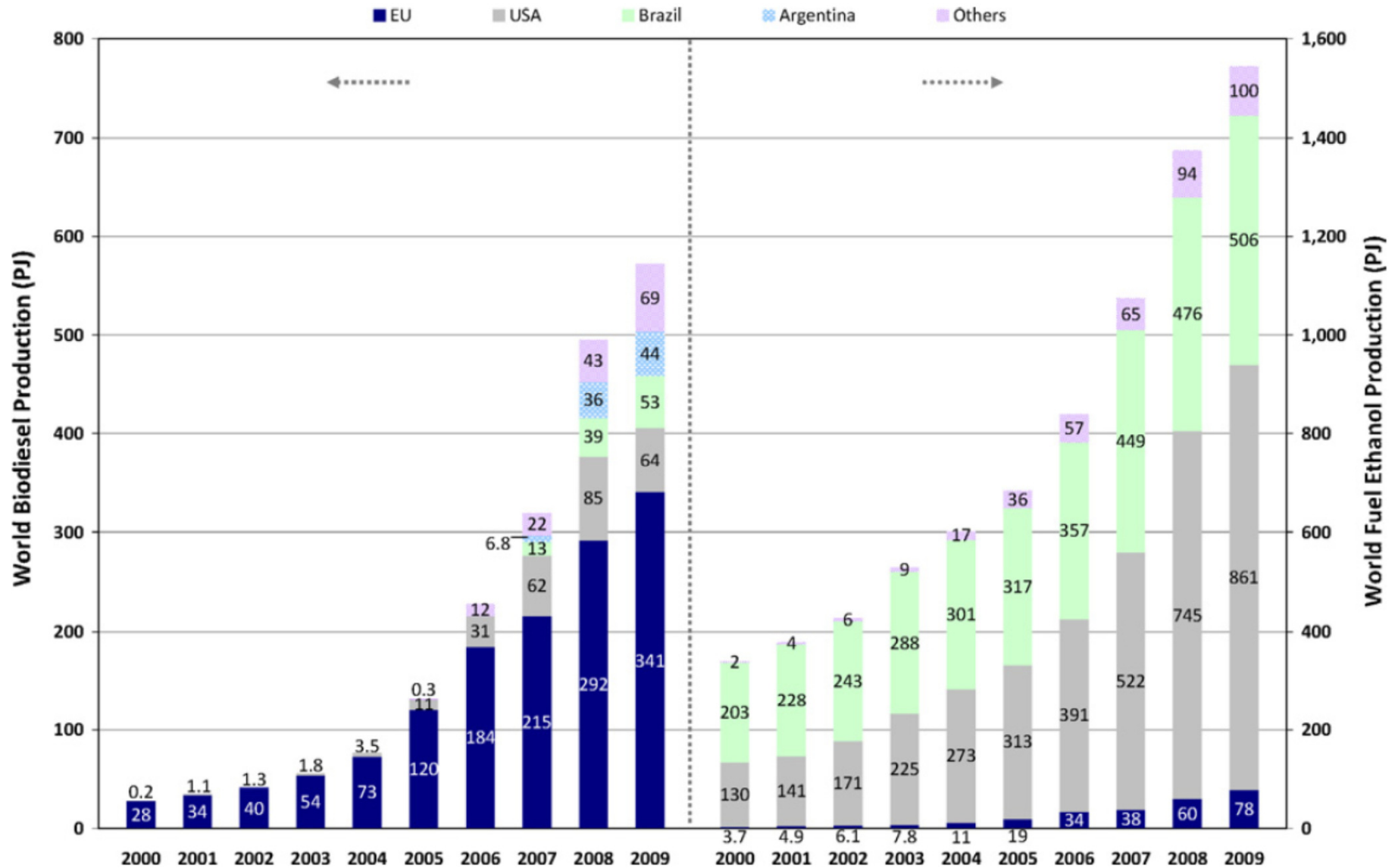
- Netherlands (T.L.)
 - Austria
 - Belgium
 - Brazil
 - Canada
 - Denmark
 - Finland
 - Germany
 - Italy
 - Japan
 - Norway
 - Sweden
 - UK
 - USA
- Explored:**
- Australia
 - S. Korea
 - South Africa

Good involvement of market parties!

Presentation overview

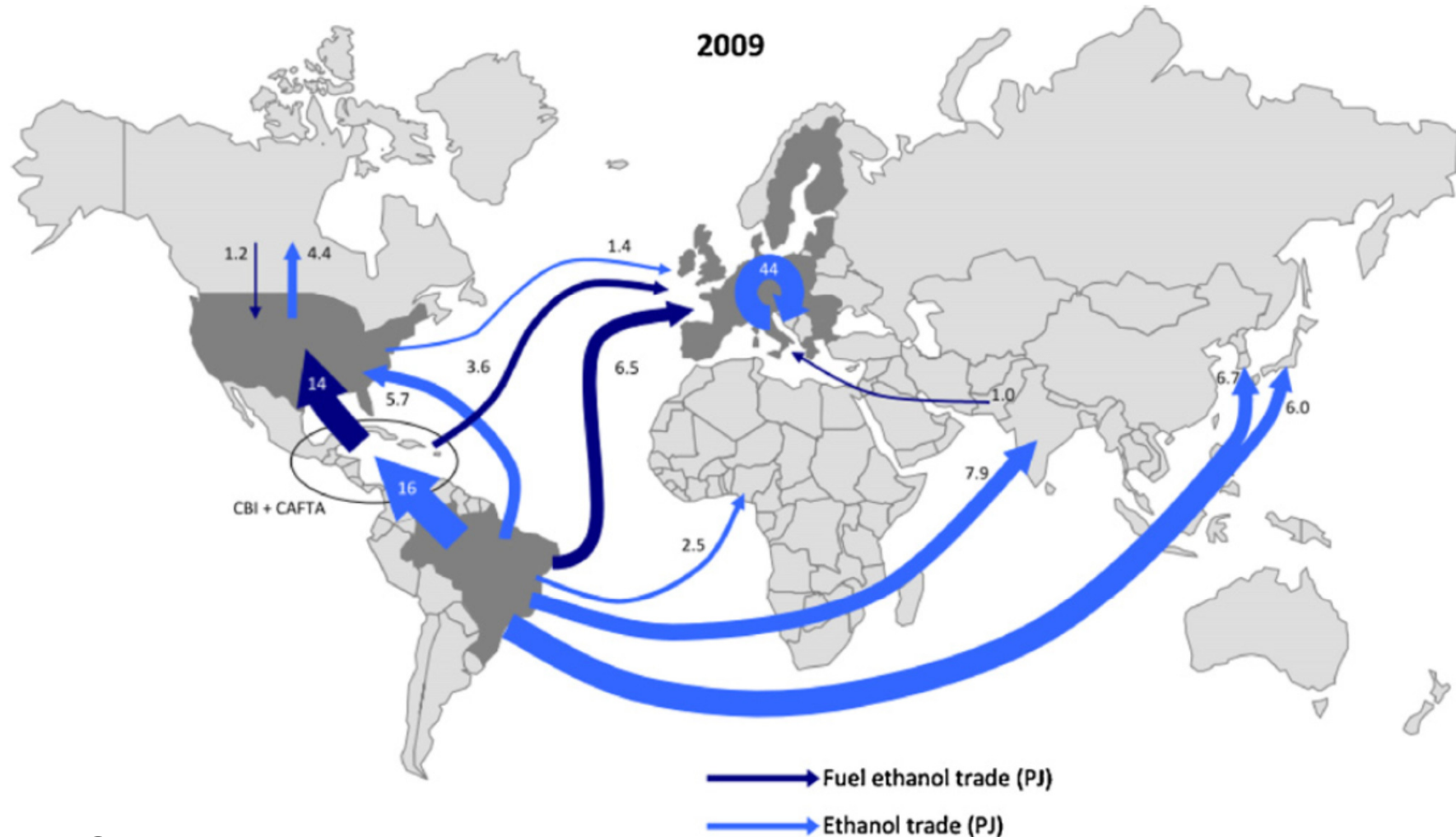
- Short: Global liquid biofuel production & trade patterns
- Comprehensive: Development solid biomass trade (mainly wood pellet)
- Outlook: scenarios for solid biomass trade from 2011 to 2020 to the EU and main challenges

Global biodiesel and fuel ethanol production 2000-2009



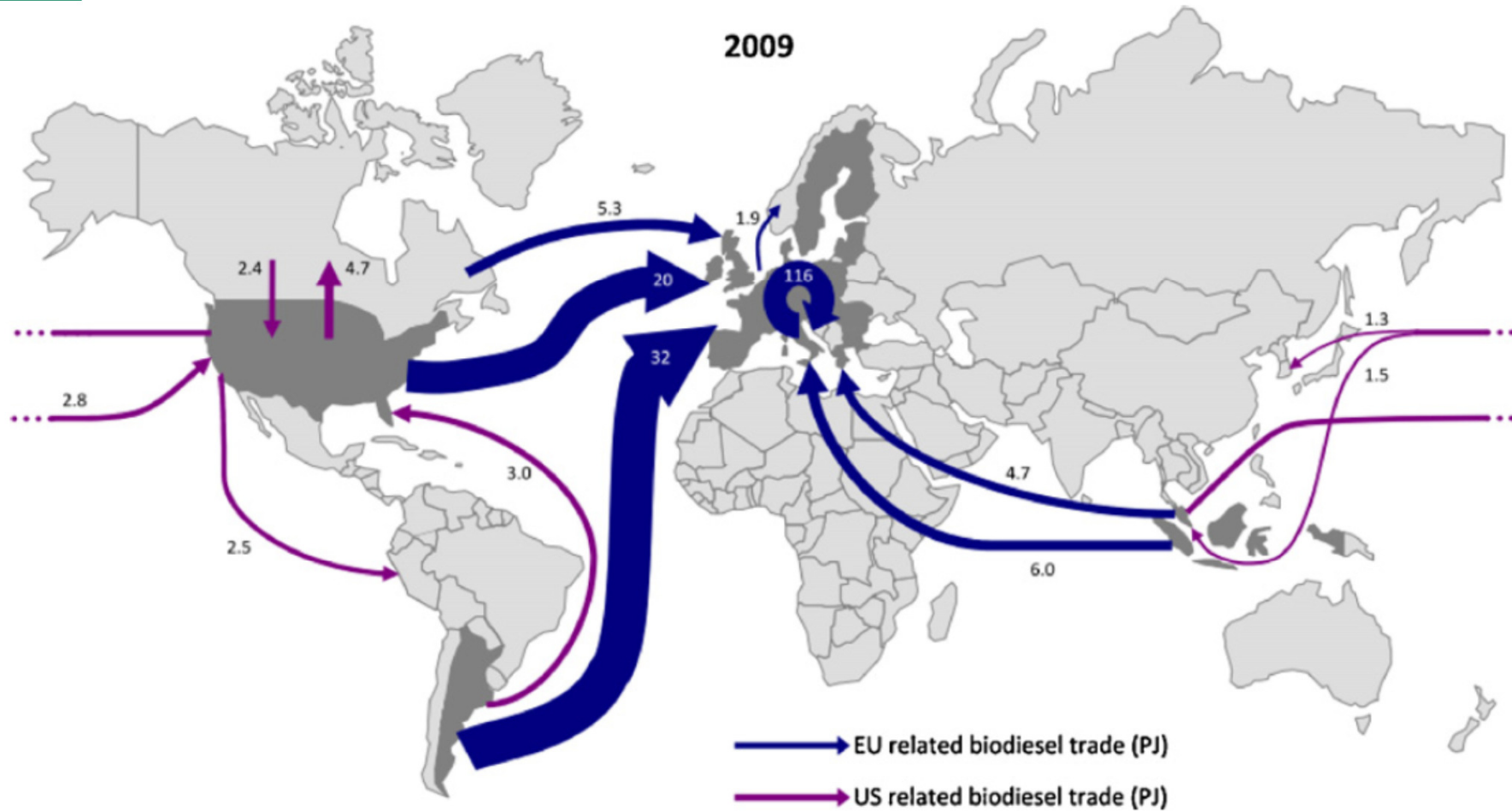
(Source: Lamers et al. 2011)

Global (fuel) ethanol trade streams of minimum 1 PJ in 2009.



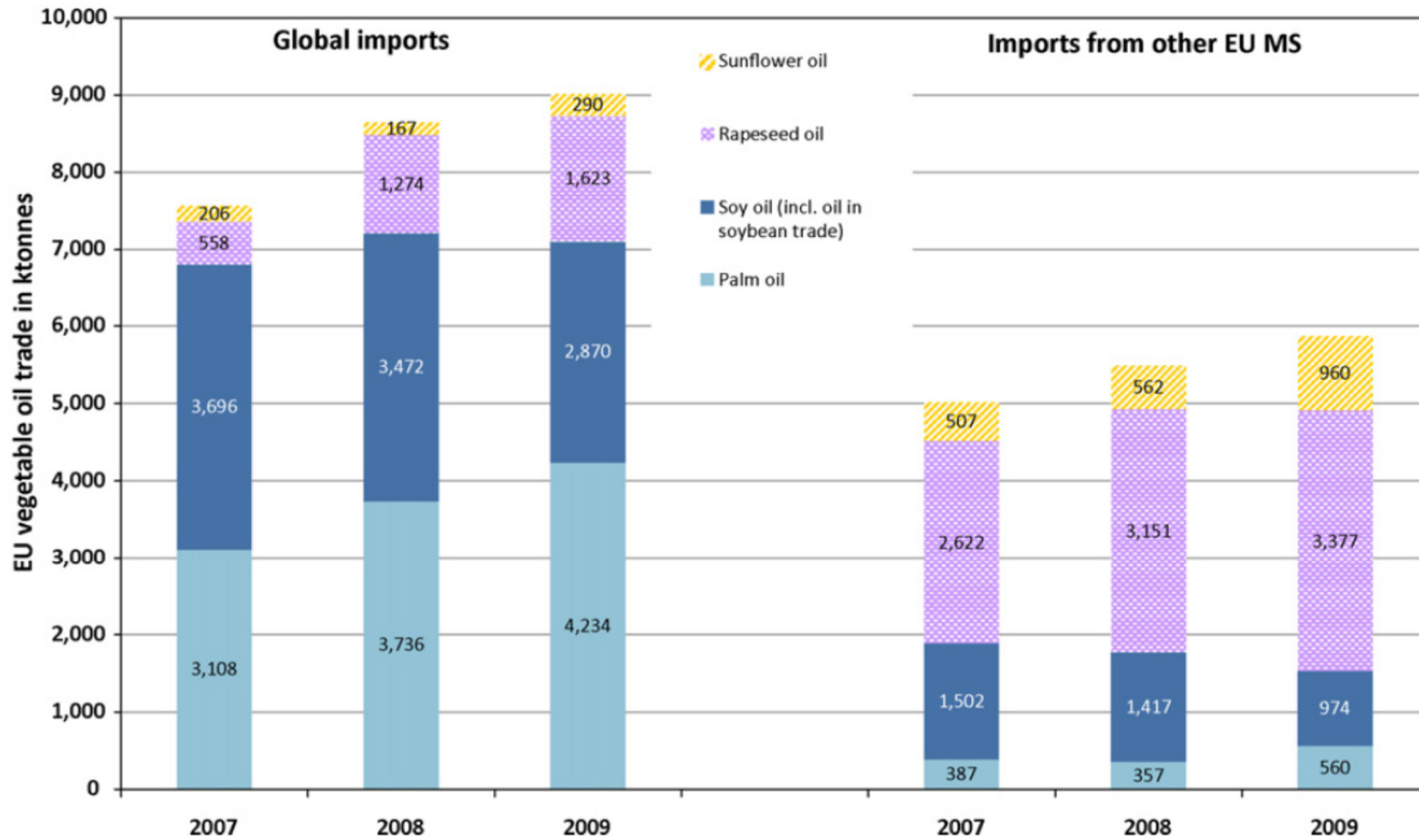
(Source: Lamers et al. 2011)

Global biodiesel trade streams of minimum 1 PJ in 2009.



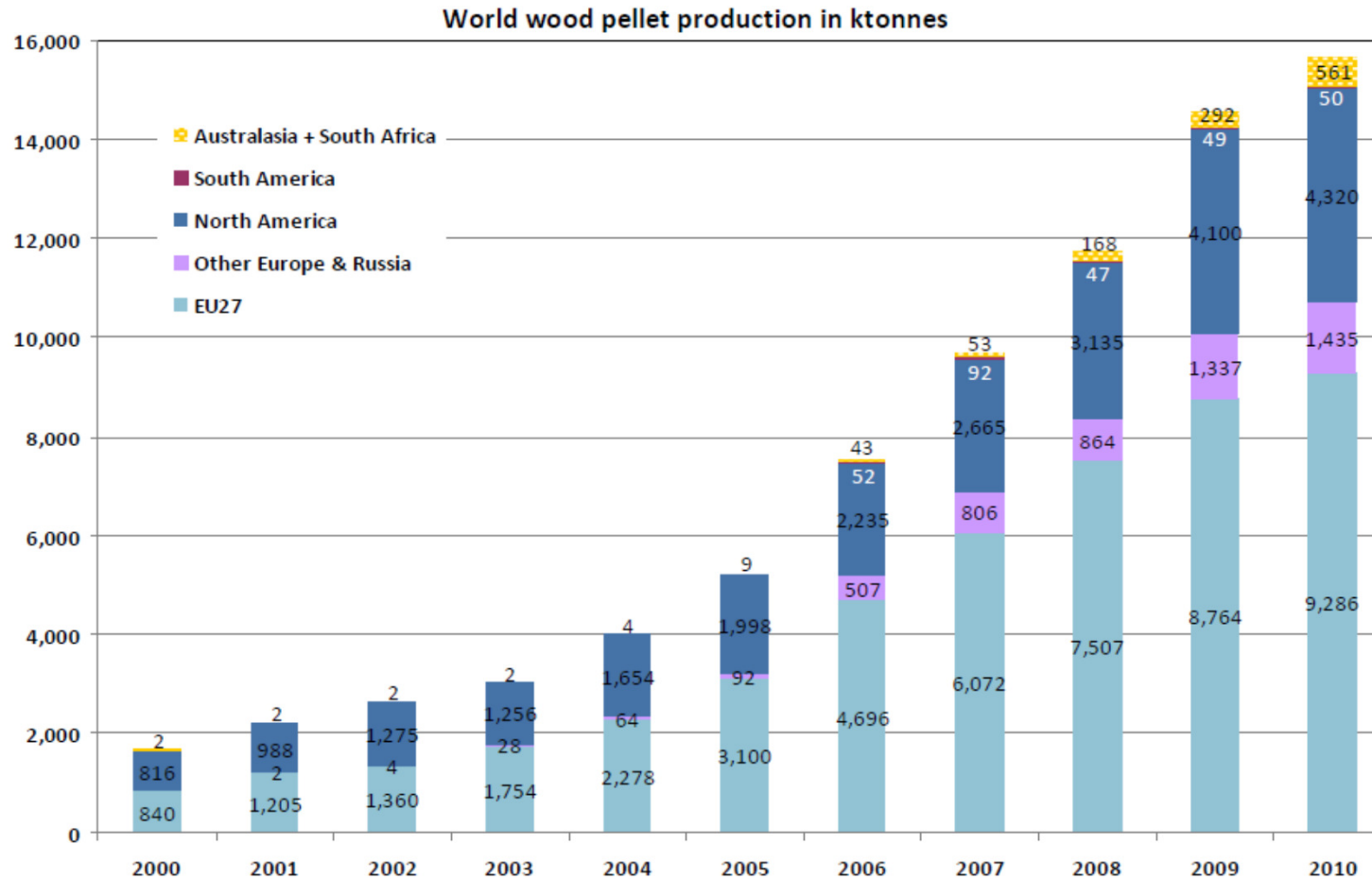
(Source: Lamers et al. 2011)

EU vegetable oil imports .



(Source: Lamers et al. 2011)

Estimated world wood pellet production 2000-2010

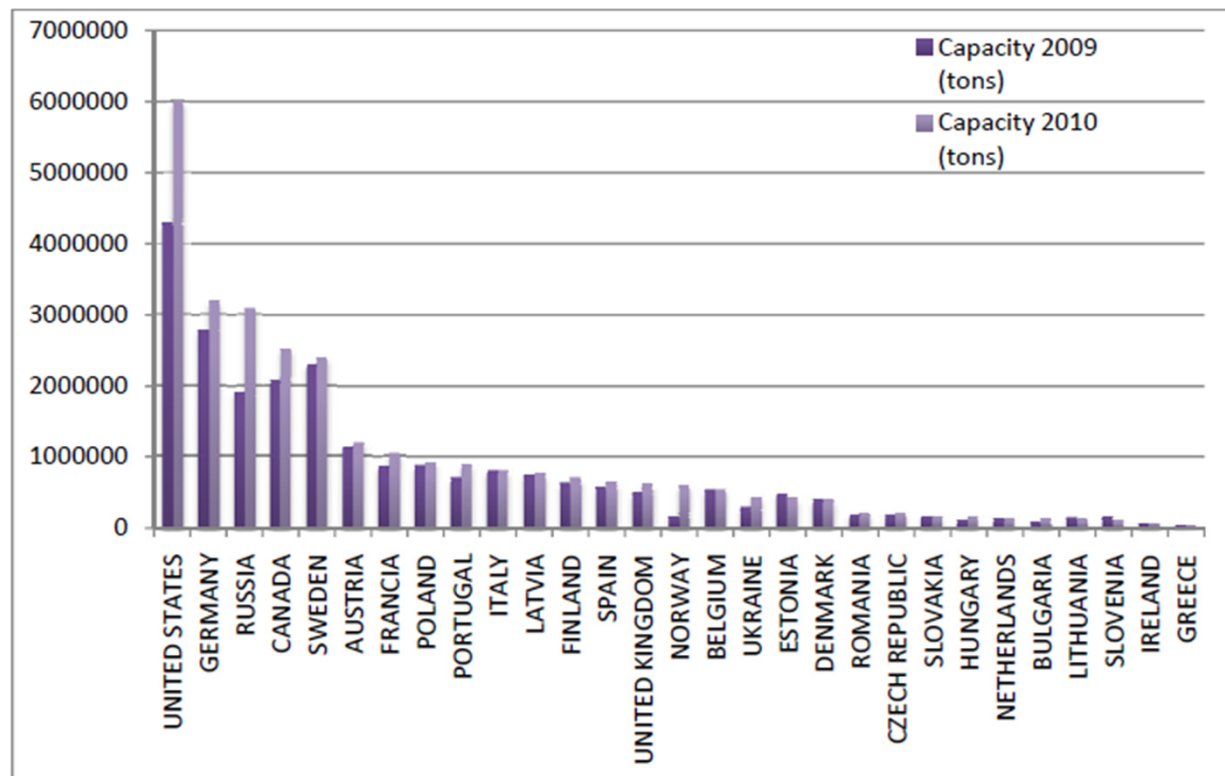


Lamers et al. 2012

Global wood pellet production 2009-2010

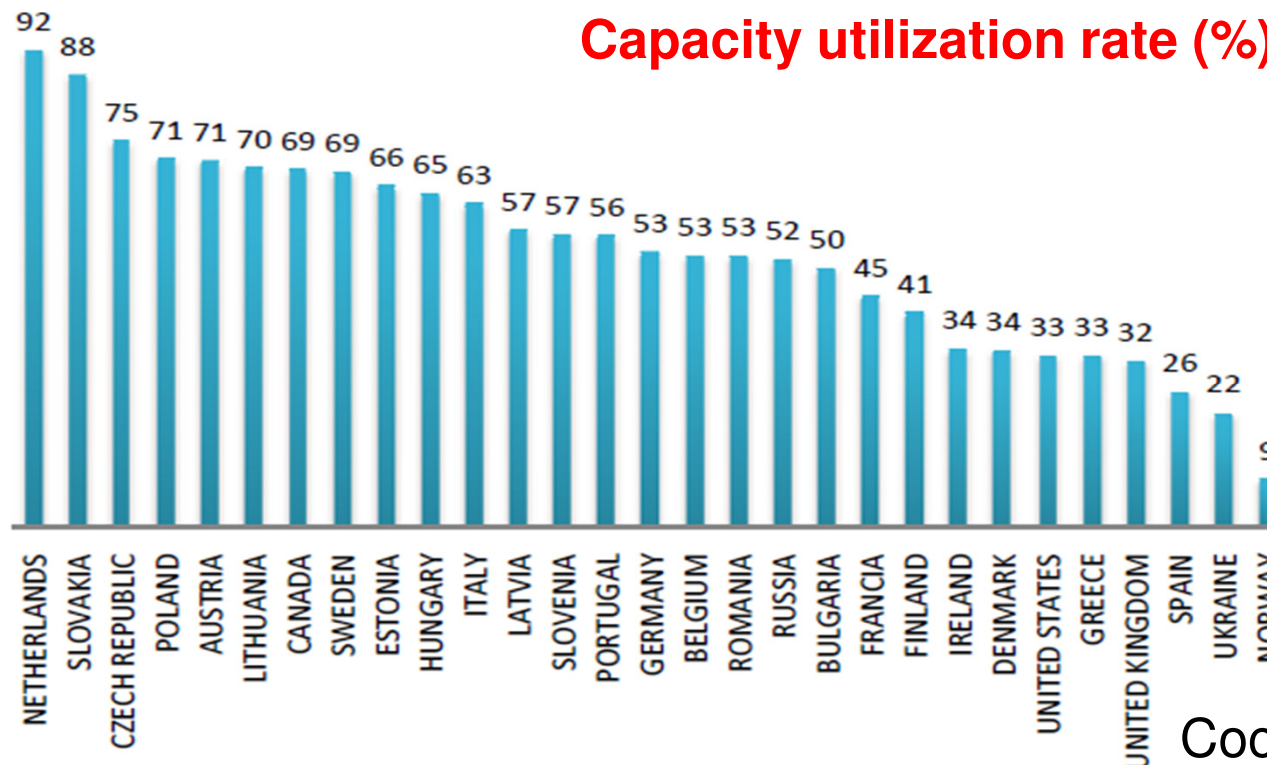
Between 2009 and 2010 the global installed production capacity of the pellet industry has recorded a 22% increase.

The highest increase in capacity occurring in U.S., Canada and Russia, followed by traditional European producing countries such as Germany, Sweden and Austria

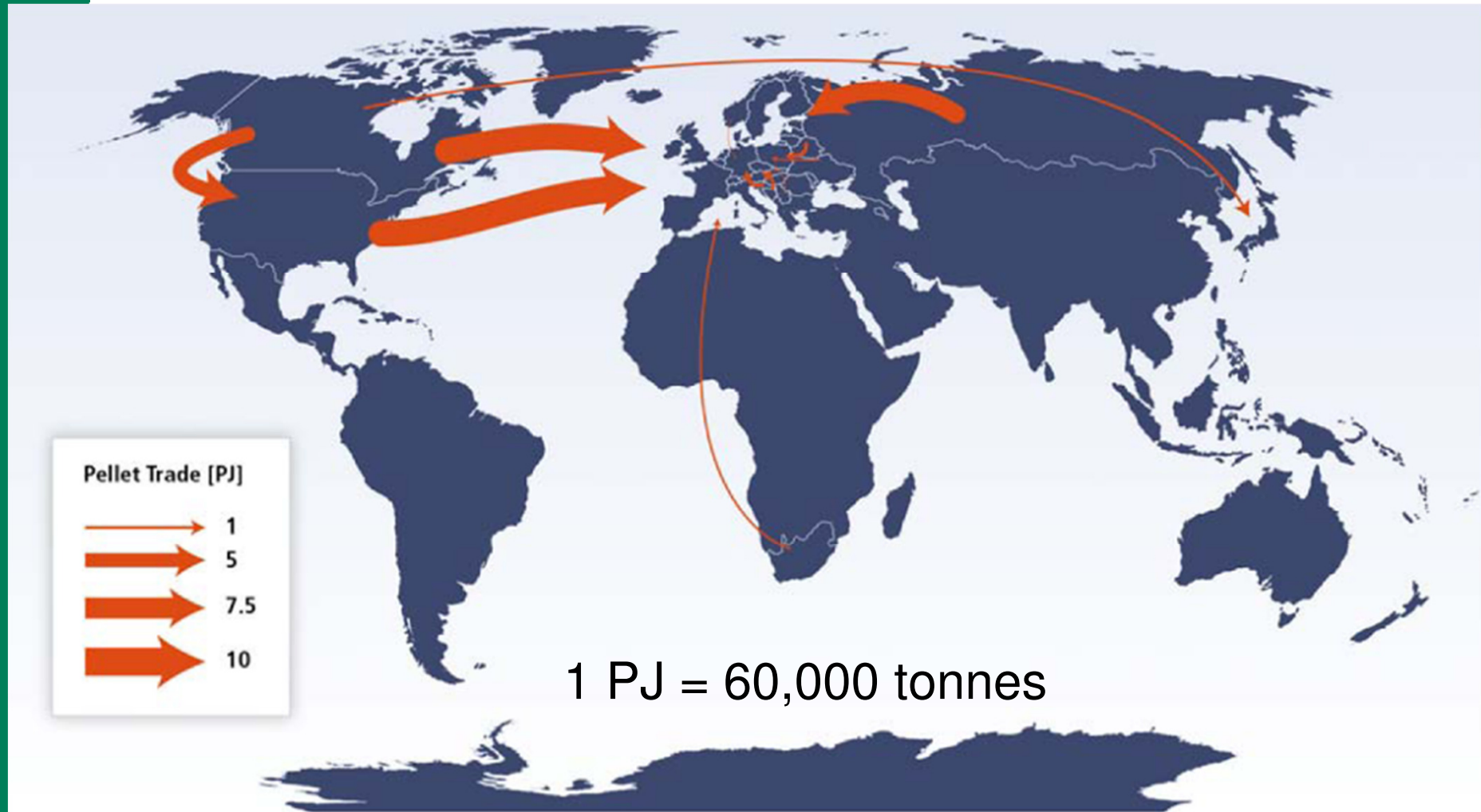


Sawmill residues still the main feedstock, but difficulties in sourcing feedstock at competitive prices => low utilization rate of the installed capacity in many pellet mills, only 53% on average.

A need for a more stable and secure supply of feedstock has emerged the interest of producers in the supply of alternative feedstock such as round-wood and forest residues is growing

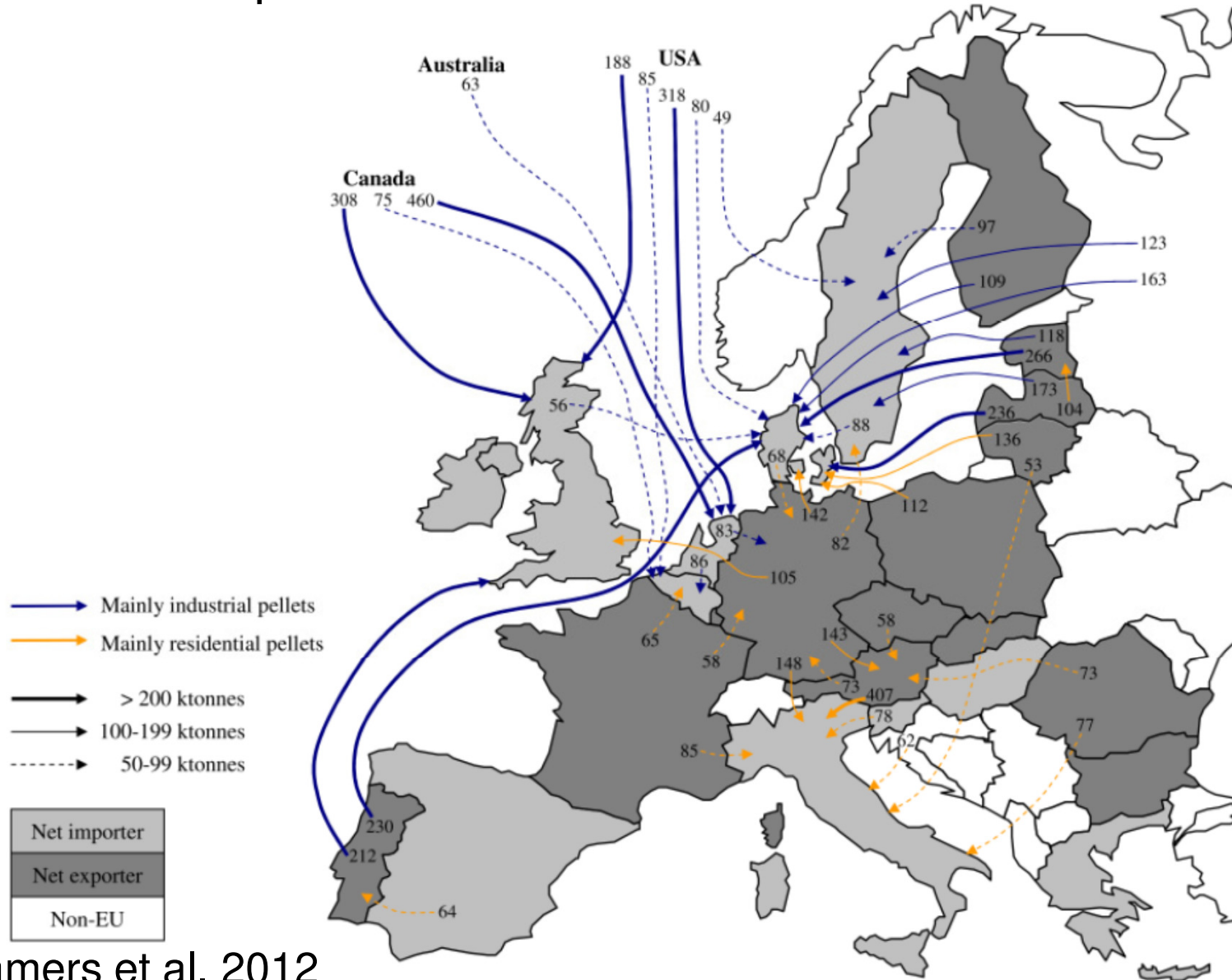


Global wood pellet trade 2009



(Source: Sikkema et al., 2011 in IPCC, 2011)

Main wood pellet streams in the EU in 2010

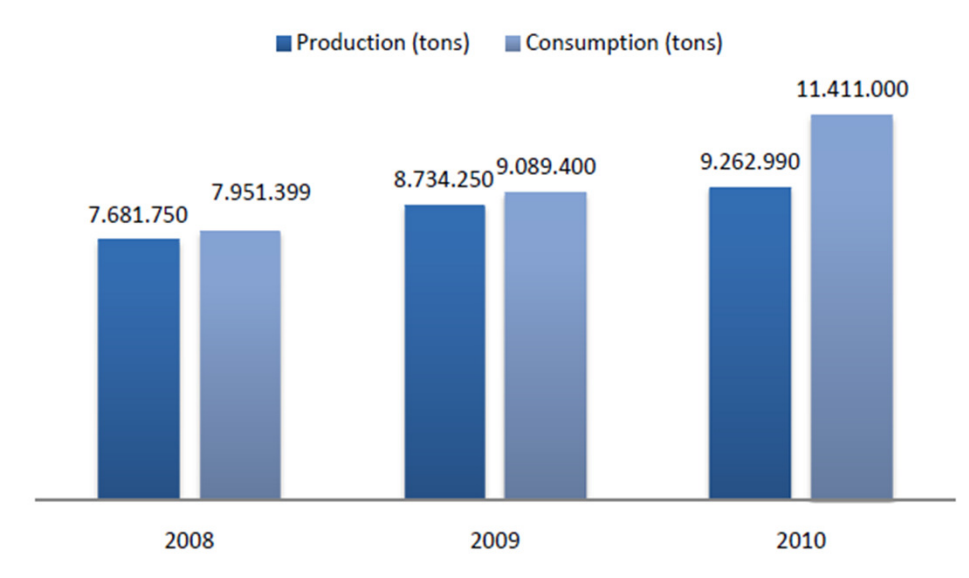


EU still the main market

Between 2008 and 2010:

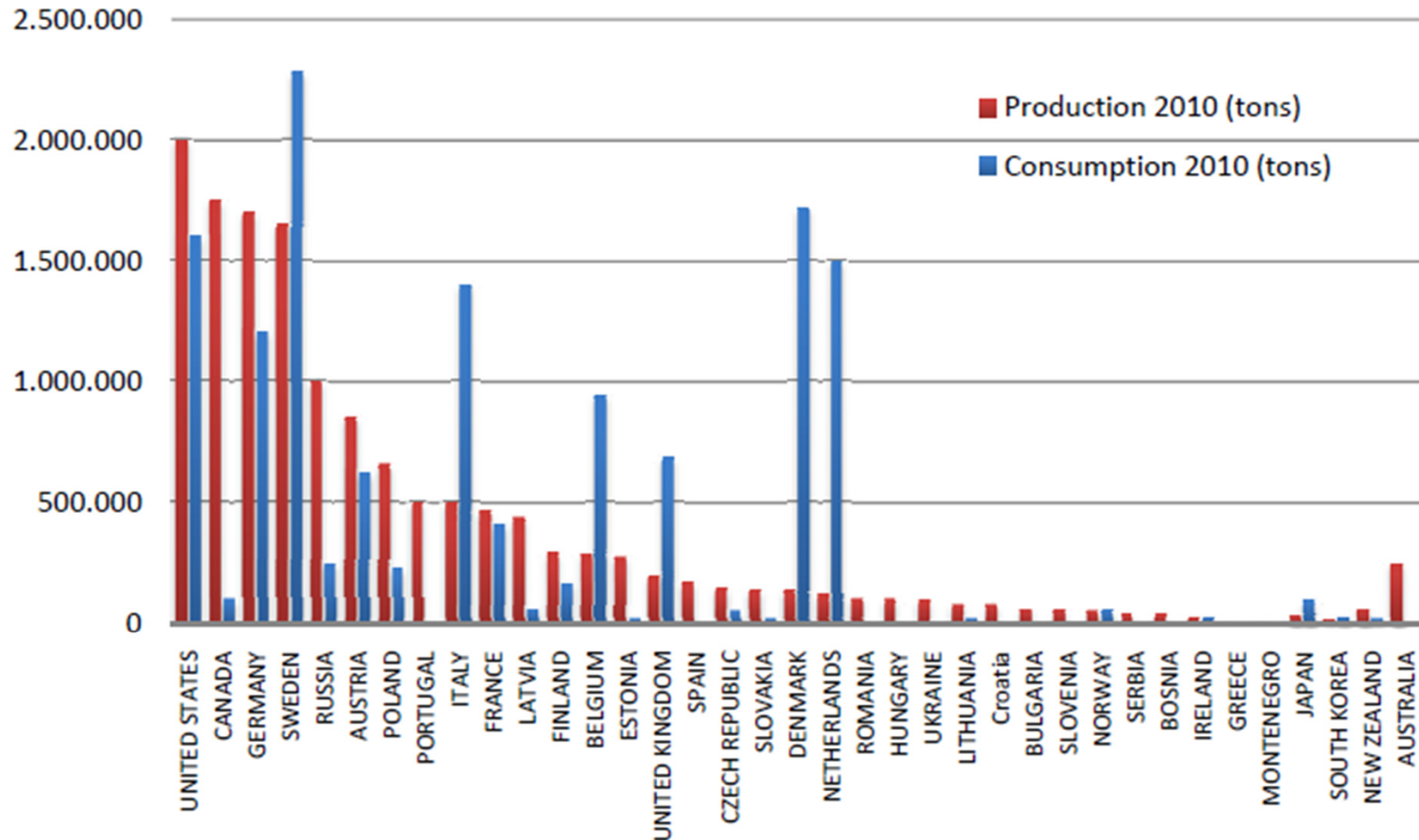
- EU production increased by 20.5% to 9.2 million tons in 2010 or 61% of the global production.
- Consumption increased by 43.5% reaching over 11.4 million tons in 2010, equal to nearly 85% of the global wood pellet demand.

The EU industry still covered 81% of the EU demand in 2010 however, the gap between production and consumption in EU has been growing from only 262,250 tons in 2008 to 2,148,000 tons in 2010, more than an 8-fold increase.



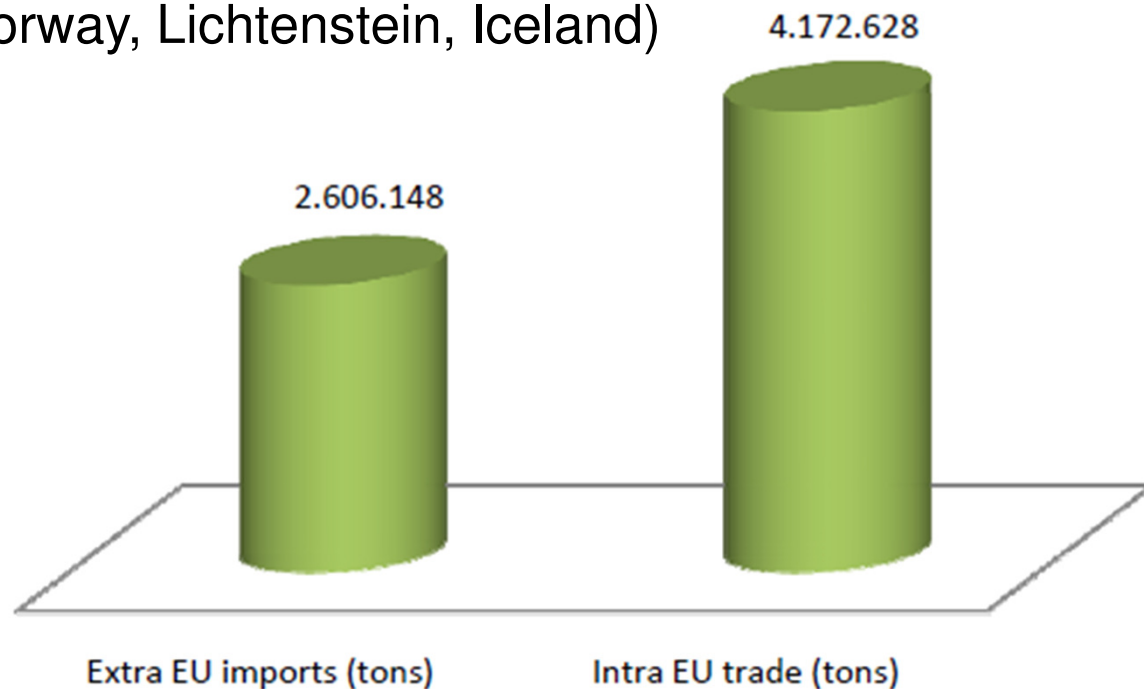
Cocchi et al. 2011

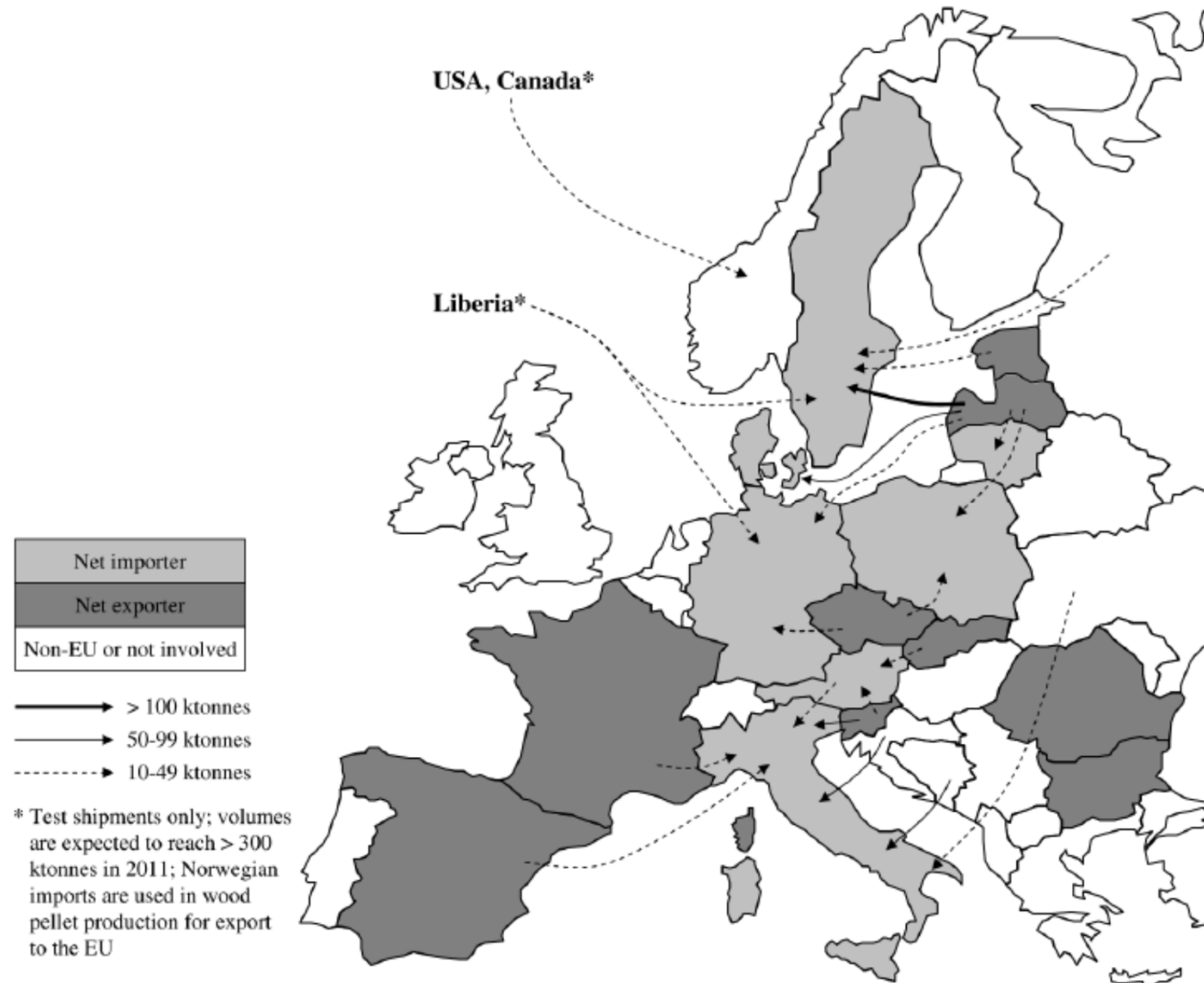
Production & Consumption by Country



International Trade Growing

- According to Eurostat, in 2010 Europe (EU27) imported more than 2.6 million tons of pellets from non-EU countries
- In the same year more than 4 million tons were traded among EU member states.
- Exports from EU member states to non-EU countries almost negligible, to countries inside the European continent (Switzerland, Norway, Lichtenstein, Iceland)



Main wood chip trade flows *for energy* in 2010

Demand Forecasts

EU

EU demand between 20-50 million tons by 2020, depending on:

- the policies on co-firing in the UK, Netherlands, Belgium, Germany, Poland, as well as the combination of market dynamics for coal plus CO₂ emission allowances;
- the continuity of support measures for the uptake of the market for pellet stoves and boilers, as well as the price of fossil fuels for heating and the related attractiveness to switch to wood pellets for small-scale users.

Demand Forecasts

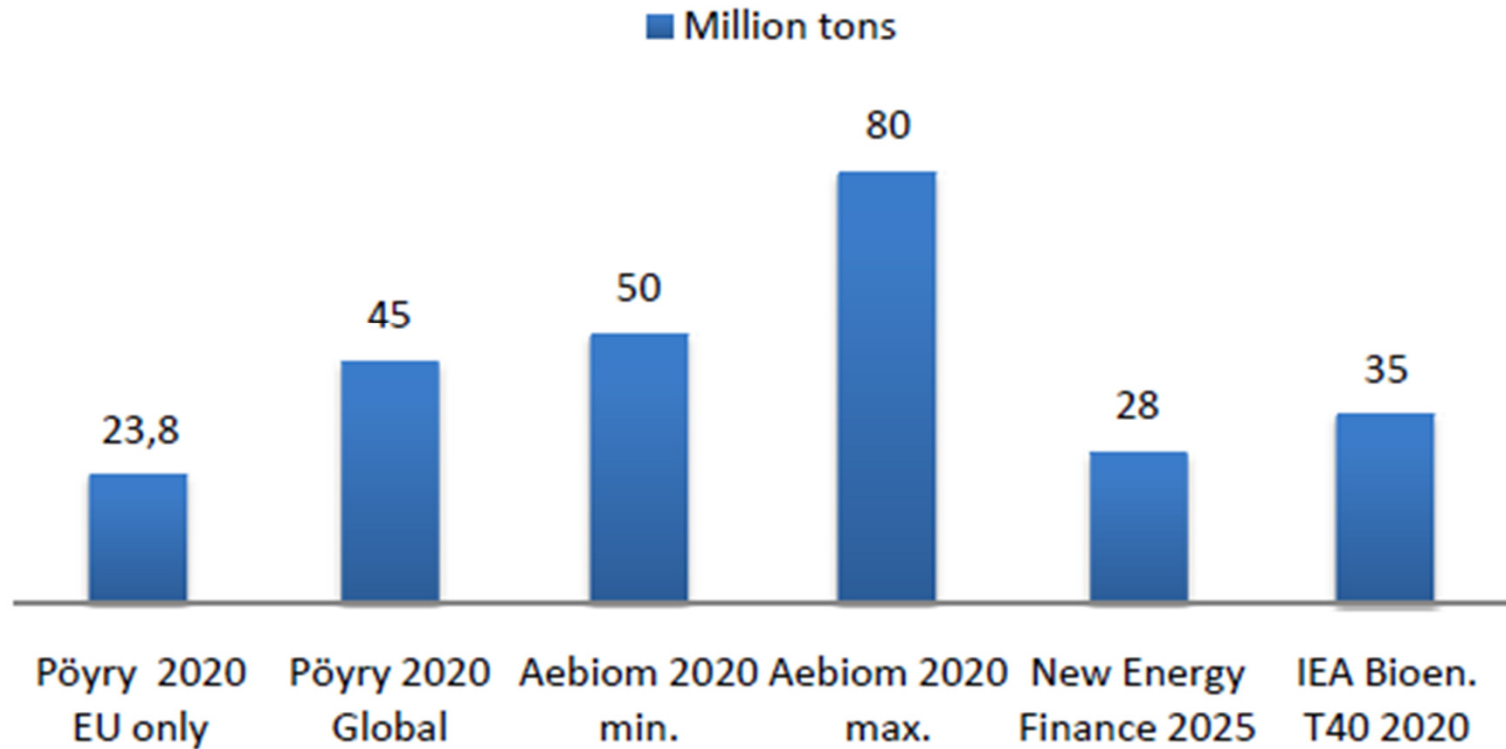
The demand in East Asia will depend on developments in Japan, South Korea and China, but can be assessed in the range between 5-10 million tons by 2020.

The demand in the U.S. will be probably limited to small-scale use in households and main imports will come from Central and Eastern Canada.

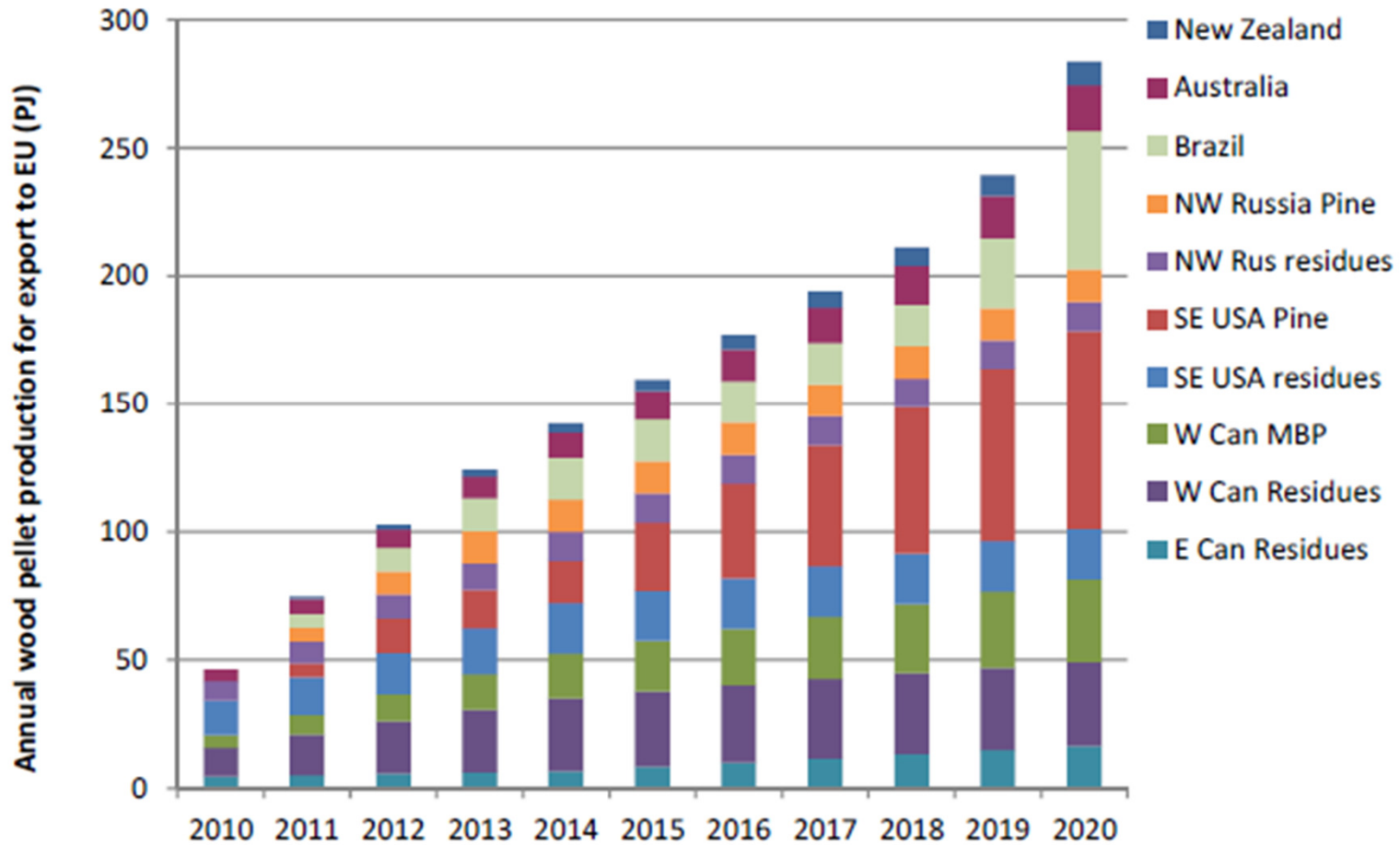
The demand in Canada will be correlated to the actual implementation of co-firing plans announced by the Ontario Power Generation to phase out coal depending on the extent fuel switch projects the domestic biomass demand might increase of several hundred thousand tons per year. However Canada still holds a strong export capacity.

Market Forecasts

Expected Wood Pellet Demand



Business as Usual Scenario



Potential Biomass Supply

Business as Usual Scenario

- Total potential available for import to EU may increase drastically to almost **16 million tons**.
- Based on past and current import trends, industry expectations, press releases of individual companies, expert opinions and on scenario studies by Schouwenberg and de Wolff (2011)

Potential Biomass Supply

High Import Scenario

- Additional 17 million tons compared to the business as usual scenario.
- **Assuming** High imports in EU will stimulate new plants and energy plantations in Brazil Uruguay Mozambique and additional use of forest products in Russia

The Challenges Ahead

Enlarging the feedstock base for wood pellets

The demand for wood pellets already outstripped the supply of sawmill residues. Large operators looking for medium/long term supply agreements with well-defined volumes and prices. Trend towards verticalization of the sector with larger pellet manufacturers, even some energy producers moving upstream along their supply chain (i.e. RWE – Georgia Biomass in U.S.).

Exploiting the basin of agricultural feedstock with agropellets

Countries with significant developments and activities in this area so far are Denmark, Poland, the Czech Republic, Ukraine, and the United Kingdom. Used mainly for co-firing. Significant trade stream from Ukraine to Poland (approx. 150,000 tons in 2009).

The Challenges Ahead

Refining the quality of pellets: the promise of torrefaction

The most promising technological approaches are based on continuous processes such as vertical moving bed reactors, screw reactors, drum reactors, torbed reactors or fluidized bed reactors. A number of demonstration plants will be commissioned by the end of 2012.

Ensuring sustainability along the value chain

Ensuring sustainable production, trade and use of wood pellets has become an essential issue for the further development of the market. A mushrooming of standards and certification schemes is ongoing. A uniform and common approach is necessary to harmonize sustainability schemes for solid biomass

The Challenges Ahead

Adapting logistics and transportation infrastructures

To accommodate the growing pellet markets new logistic infrastructures will be needed. Large investments will be required to achieve this. Many regions rich in biomass resources do not have the financial capability of developing the resource. A Bio-trade Equity Fund could be created to fill the investment gap, enabling development in new biomass supplies, reducing risk by investing in the whole supply chain and securing fibre supply contracts, efficient ground transport, large conversion plants, efficient ports and safe off-take agreements.

The Challenges Ahead

Transforming wood pellets into a global commodity

“IWPB” focusing on the legal framework, developing contractual and financial measures to increase market liquidity and price stability, technical specifications, sampling standards and common sustainability requirements.

World’s first biomass exchange launched in November 2011 by APX-ENDEX and the Port of Rotterdam. The new exchange will allow market participants to trade standard contracts in a transparent environment. Certification of sustainability mandatory for traded lots.

Thanks for your attention

For more information, see:

www.bioenergytrade.org

- **T40 global wood pellet market study (Cocchi et al. 2011)**

Other Refs:

Lamers, P., M. Junginger, C. Hamelinck and A. Faaij (2012). "Developments in international solid biofuel trade – an analysis of volumes, policies, and market factors." *Accepted for publication in Renewable & Sustainable Energy Reviews*. DOI:10.1016/j.rser.2012.02.027.

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Sikkema, R., Steiner, M., Junginger, M., Hiegl, W., Hansen, M.T., Faaij, A. (2011) The European wood pellet markets: current status and prospects for 2020. *Biofuels, Bioproducts and Biorefining* 5(3) 250-278.